

# 20.109

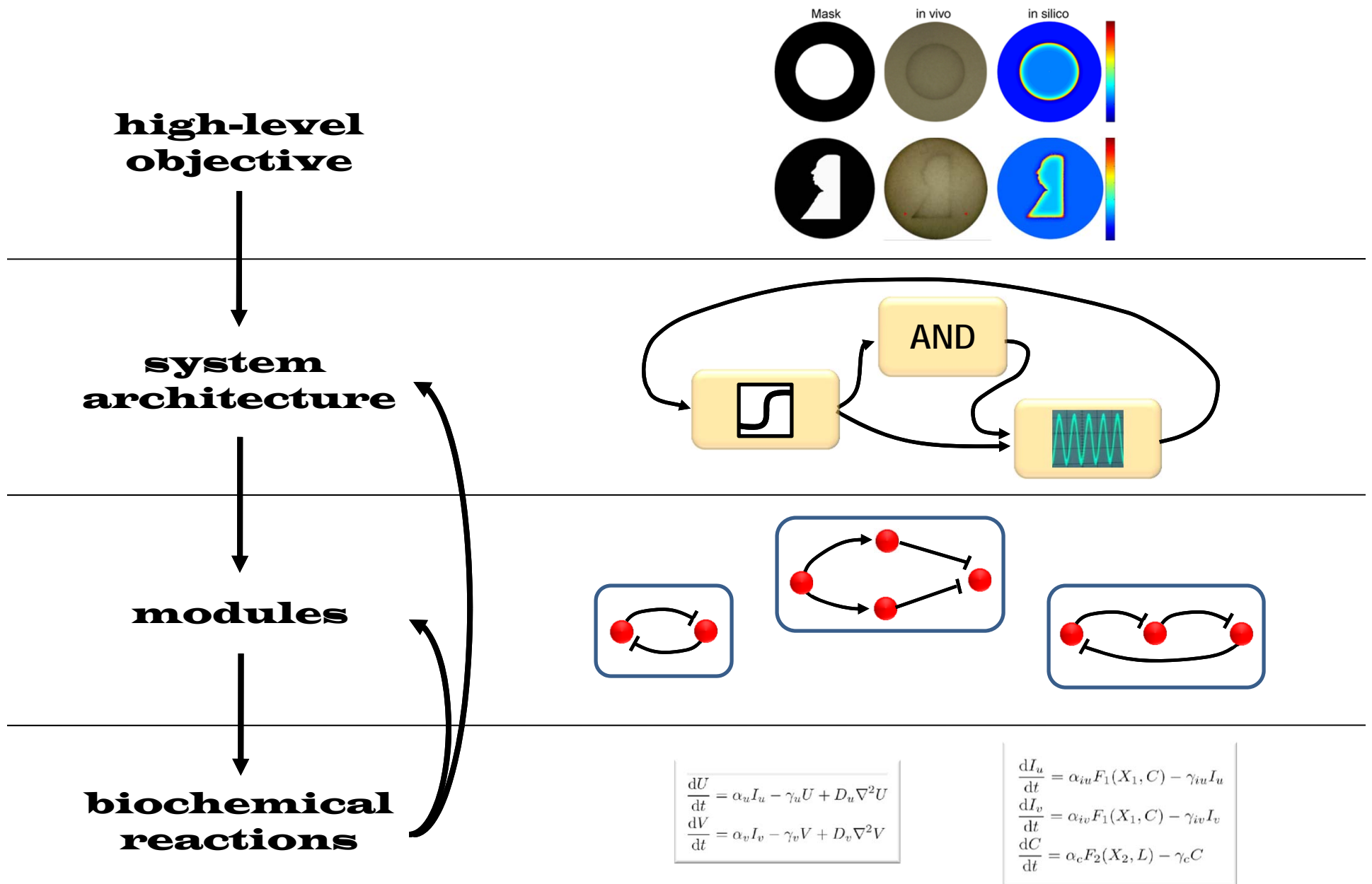
## Synthetic Biology Module

### Lecture #2

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Department of Biological Engineering  
MIT

# System design and implementation



# Genetic Edge Detection Algorithm

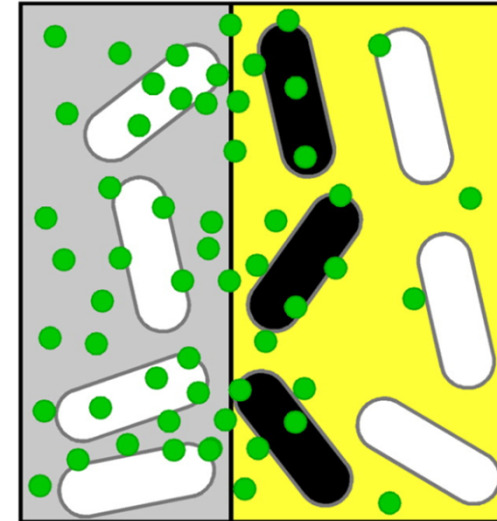
- Pseudocode:

IF NOT (light)

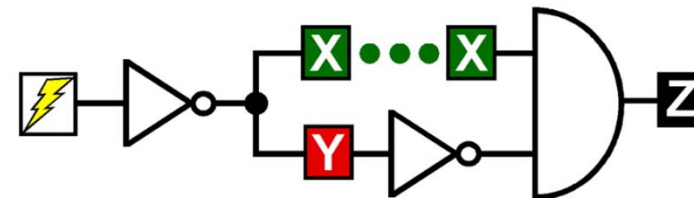
    produce signal

IF signal AND NOT (NOT light)

    produce pigment

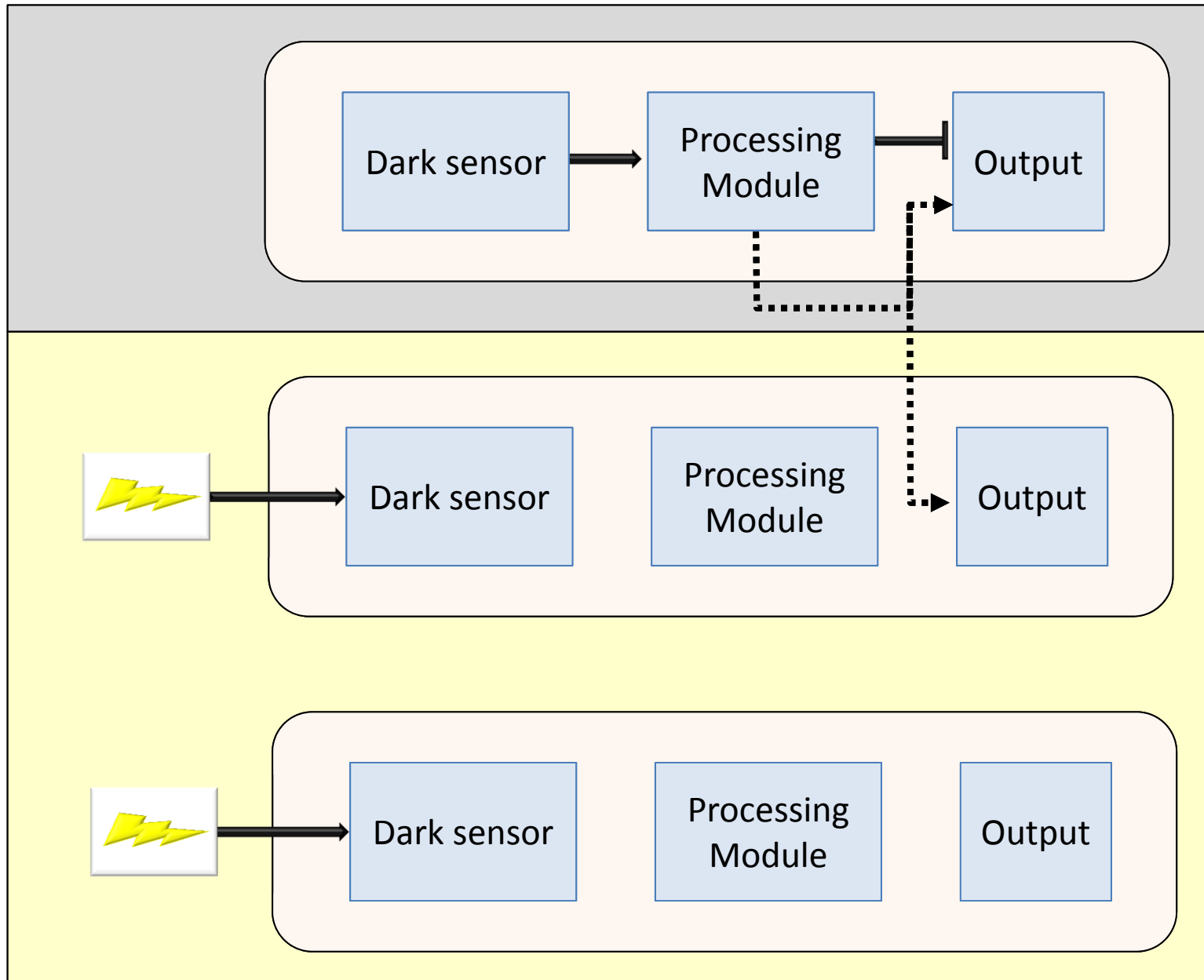


- Produce signal –  
generate diffusible  
communication signal
- Produce pigment –  
produce black pigment

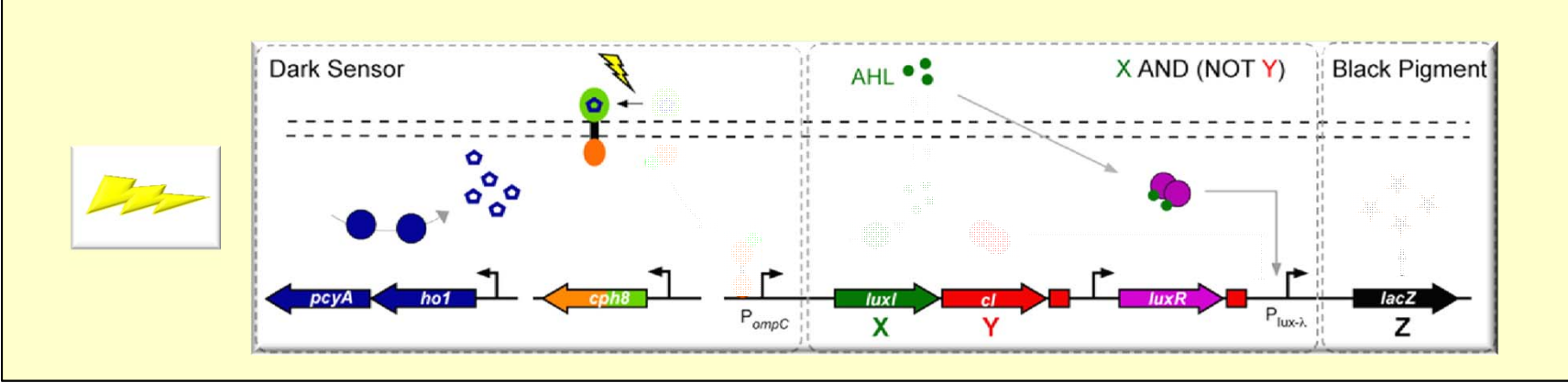
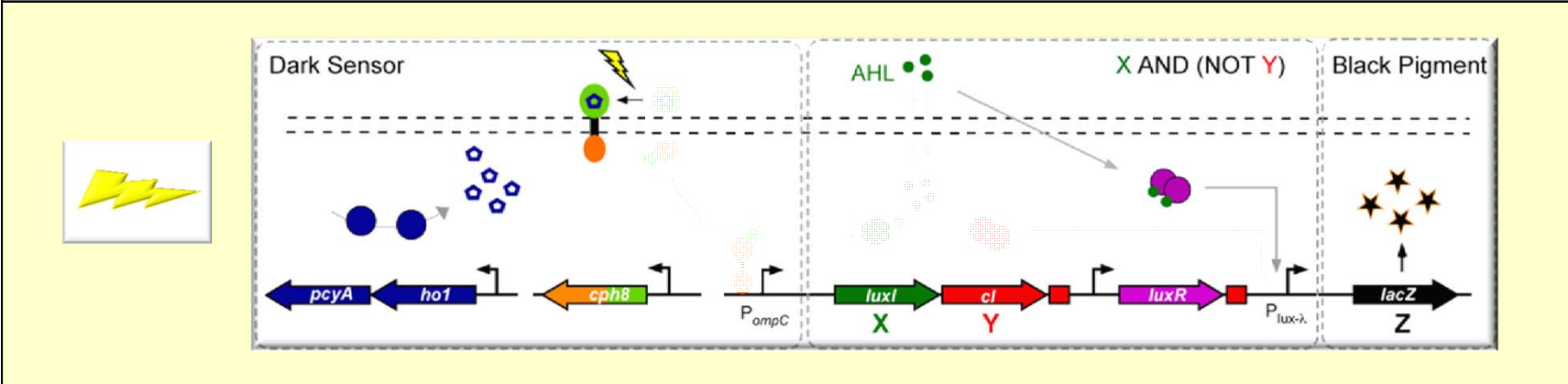
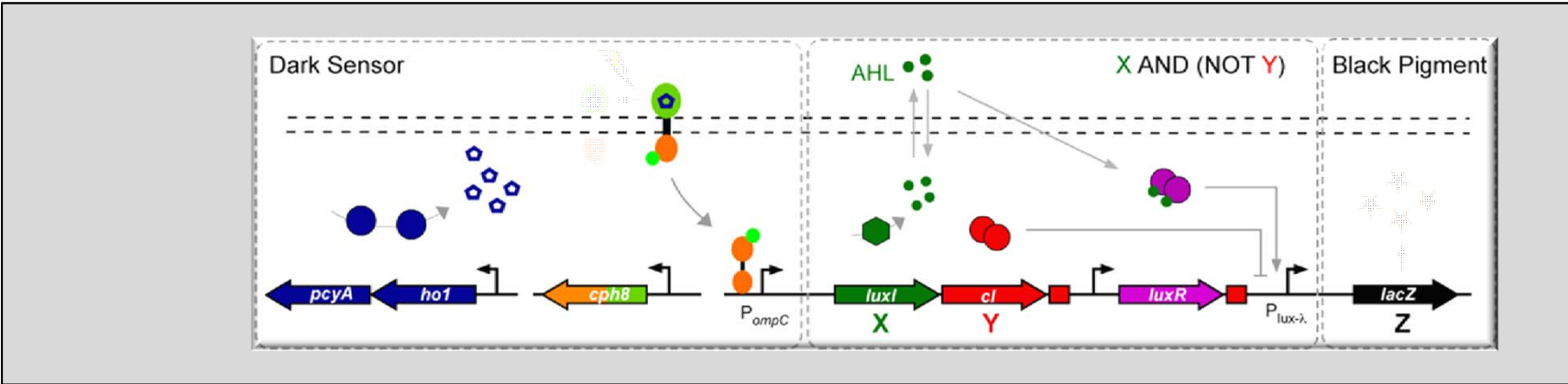


X	Y	Z
0	0	0
1	0	1
0	1	0
1	1	0

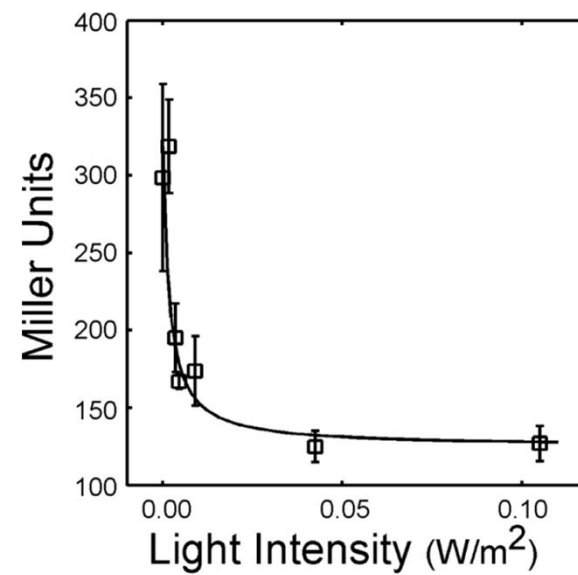
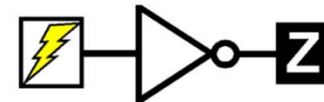
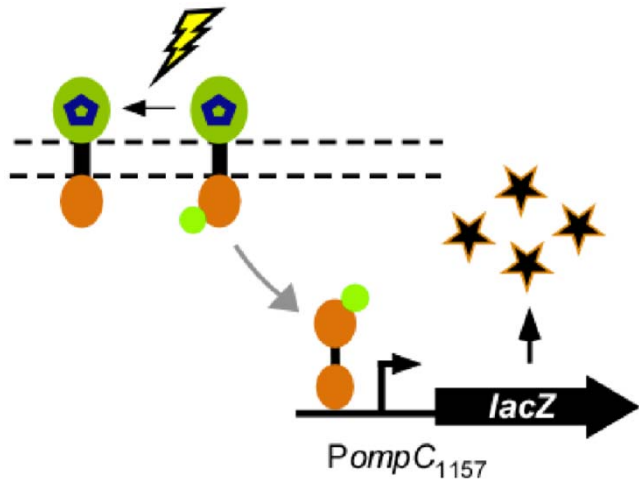
# Abstract operation of the system



## Detailed operation of the system



# Transfer Function for Dark Sensor

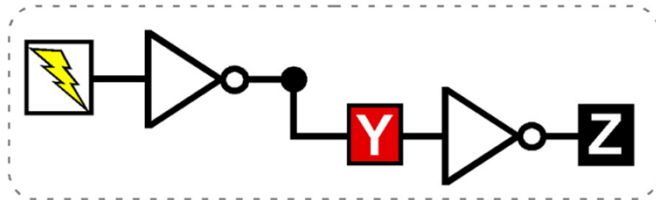


# Big money

- For \$5:  
What was the incorrect slide from last lecture?

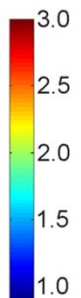
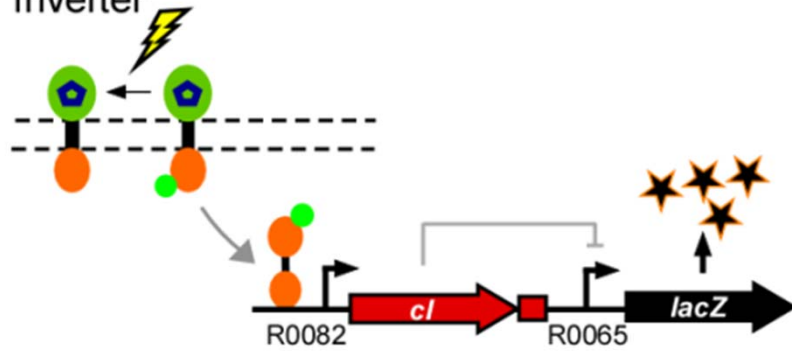
# III. Inverter

Inverter



- But with R0065, B-gal should be expressed only where AHL AND NOT (NOT light)

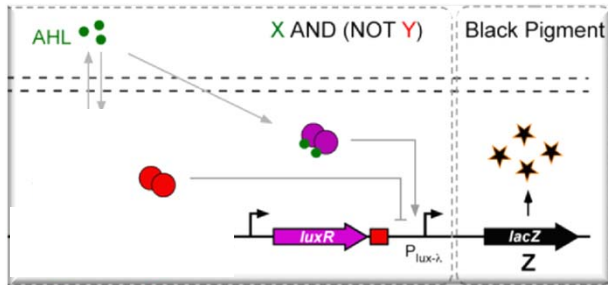
Inverter





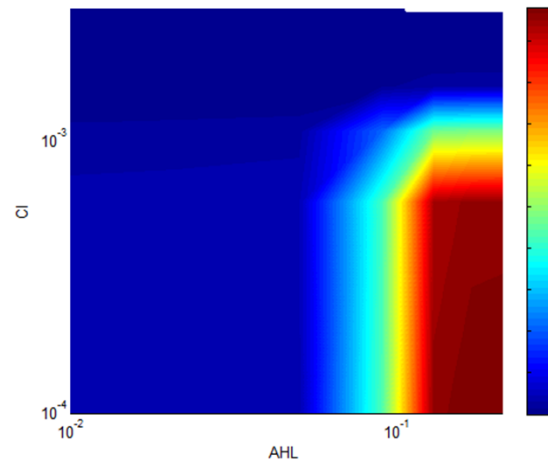
# Edge detection with idealized (Top) versus broken (bottom) pLux/cl

pLux/cl

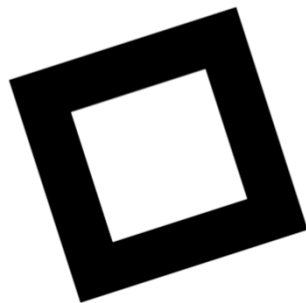
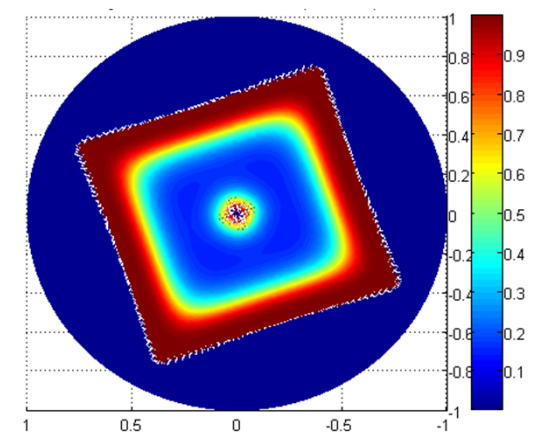


“Ideal”

pLux/cl transfer function

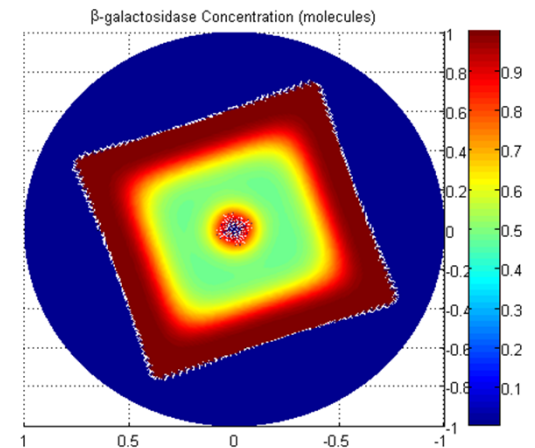
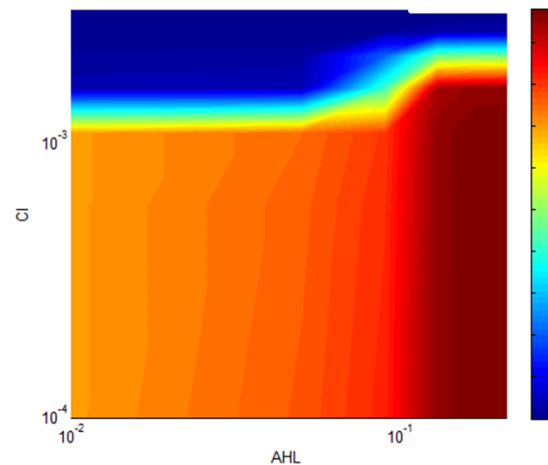


B-gal behavior?



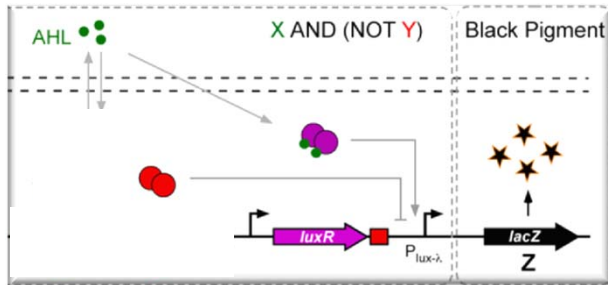
Mask

“Broken”

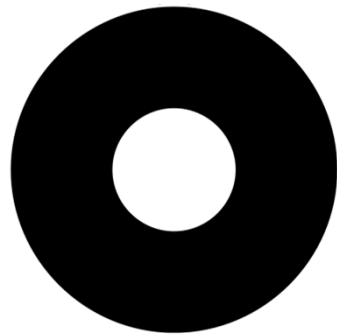


# Edge detection with idealized (Top) versus broken (bottom) pLux/cl

pLux/cl



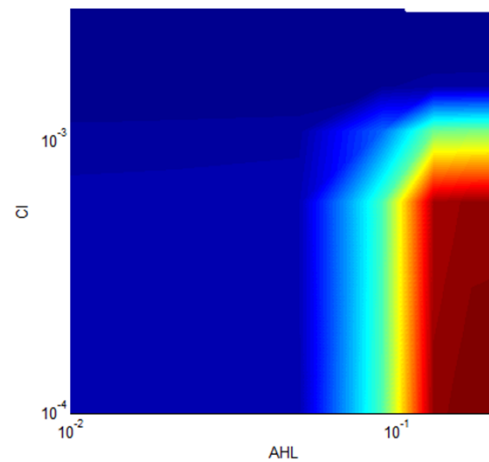
“Ideal”



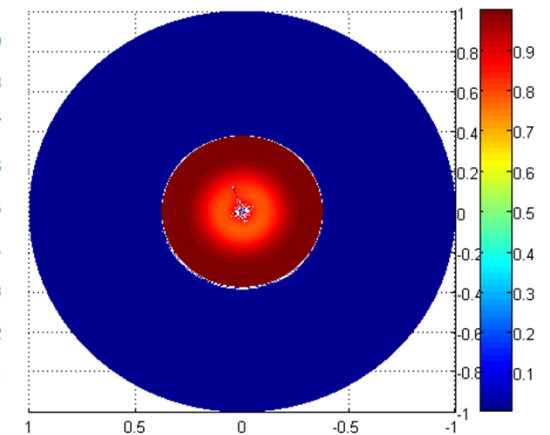
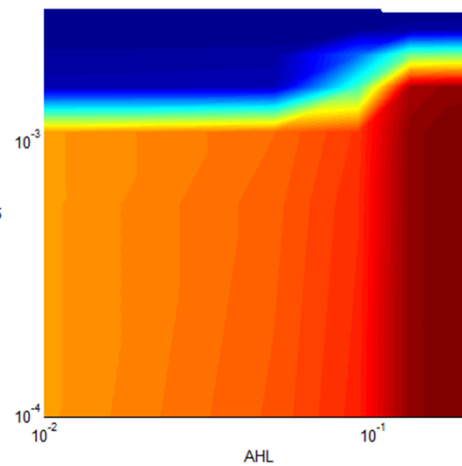
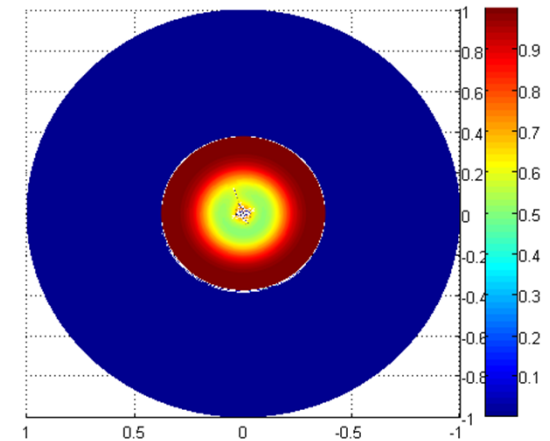
Mask

“Broken”

pLux/cl transfer function

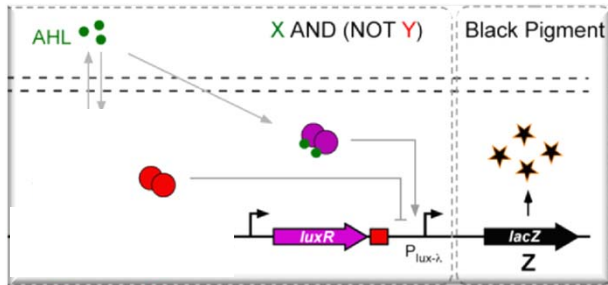


B-gal behavior?



# Edge detection with idealized (Top) versus broken (bottom) pLux/cl

pLux/cl

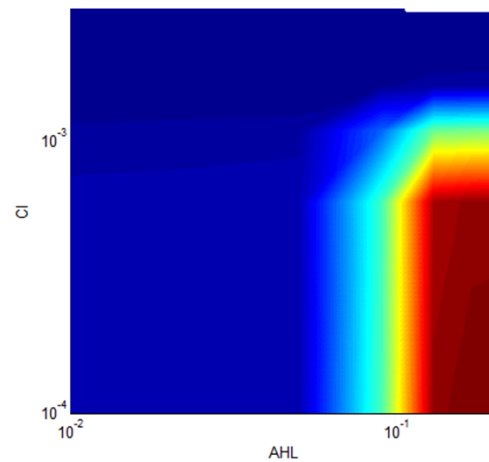


“Ideal”

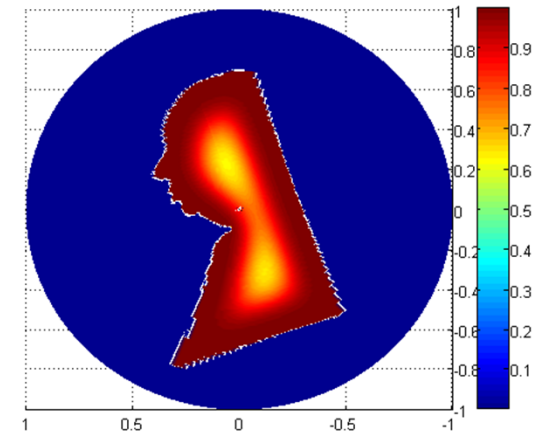


Mask

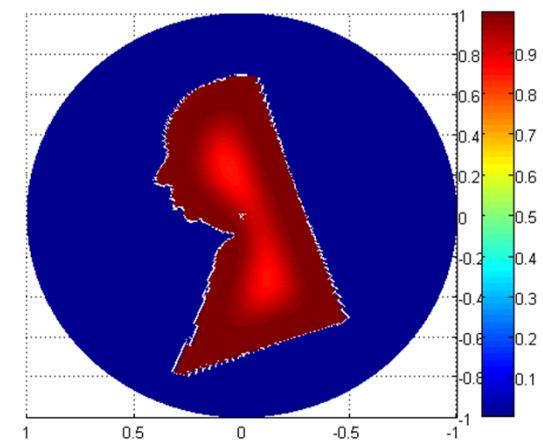
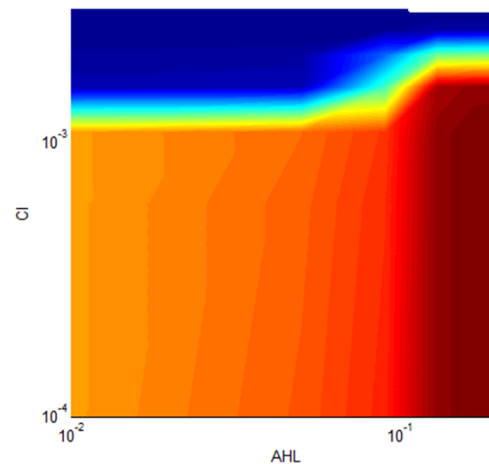
pLux/cl transfer function



B-gal behavior?

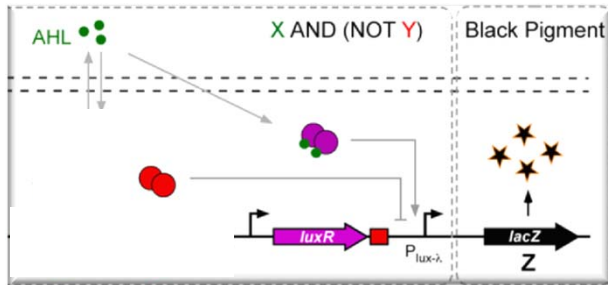


“Broken”



# Edge detection with idealized (Top) versus broken (bottom) pLux/cl

pLux/cl



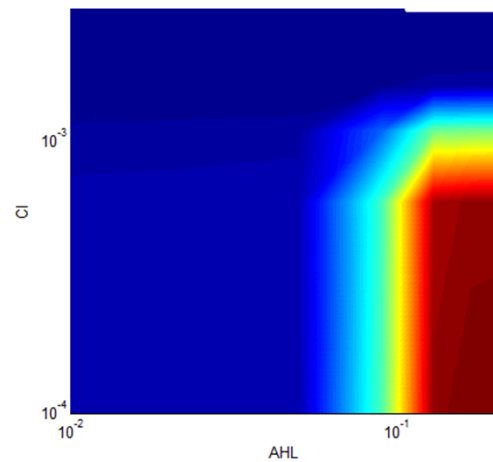
“Ideal”



Mask

“Broken”

pLux/cl transfer function



B-gal behavior?

